Preparing a soluble salt

Equipment (per group)

- Access to a kettle to supply hot water
- 1 x bunsen burner, tripod, gauze, mat
- 1 x balance (1 or 2 decimal place display)
- 1 x 250 cm³ beaker
- 1 x boiling tube
- 1 x 25 cm³ measuring cylinder
- 1 x spatula
- 1 x stirring rod
- 1 x dropping pipette
- 1 x weighing boat
- 1 x 100 cm³ conical flask
- 1 x filter funnel and filter paper
- Anti-bumping granules
- Wooden splints
- Evaporating basin or old petri dish (preferably scratched)

Safety equipment: safety spectacles

Preparation

- Copper(ii) oxide powder – between 1.8 and 2.0 g
- 15 cm³ sulfuric(vi) acid

Equipment set-up and tips

You can reduce the equipment needed by pre-measuring the sulfuric acid and the copper(ii) oxide. Always follow the risk assessment for a particular class and for the room to position the Bunsen burners.

Sulfuric acid is warmed in a beaker of boiled water for 2 to 3 minutes. A slow cooling rate will produce larger crystals.

Safety

Read our standard health & safety guidance and carry out a risk assessment before running any live practical.
Hazard classification may vary depending on supplier.

<table>
<thead>
<tr>
<th>Chemical supplied for the practical</th>
<th>Preparation</th>
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</thead>
<tbody>
<tr>
<td>Copper(ii) oxide powder</td>
<td>Dilute using sulfuric(vi) acid 2.0 mol dm(^{-3})</td>
</tr>
<tr>
<td>CuO (s)</td>
<td>H(_2)SO(_4) (aq)</td>
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</table>

**WARNING**
Harmful if swallowed
Causes skin irritation
Harmful if inhaled
Very toxic to aquatic life with long-lasting effects
Causes serious eye irritation

**DANGER**

Sulfuric(vi) acid 1.4 mol dm\(^{-3}\)
H\(_2\)SO\(_4\) (aq)

**WARNING**
Irritant (skin, eyes)

**DANGER**
Corrosive – skin and eyes
(Measure 70 cm\(^3\) of sulfuric(vi) acid 2.0 mol dm\(^{-3}\) and make up to 100 cm\(^3\) with distilled/deionised water. Scale-up as required)
Or prepare from concentrated acid
sulfuric(vi) acid concentrated
H\(_2\)SO\(_4\) (l)
MW = 98.07 g mol\(^{-1}\)

**DANGER**
Causes severe skin burns and eye damage

- The sulphuric acid can be pre measured in a boiling tube, which can be covered with Parafilm.
- Pre-weigh the copper(ii) oxide powder in a bijou bottles or in a weighing boat, if possible.
- This experiment is based on the CLEAPSS method and the specific concentration of sulfuric acid should produce an almost saturated solution of copper(ii) sulfate hence minimal heating is needed to evaporate excess water.
- Crystals should start forming very quickly when the solution cools down.
- Old and scratched petri dishes are better as they provide a rough surface for the crystals to grow.
Chemical produced

Copper(ii) sulfate(vi)–5–water solid
CuSO₄·5H₂O (s)
MW = 249.68 g mol⁻¹

DANGER
Harmful if swallowed
Causes skin irritation
Causes serious eye damage
Very toxic to aquatic life with long lasting effects

Do not leave the copper(ii) sulfate solution to evaporate in the laboratory and do not let the students take the crystals home.

Disposal

The excess of copper(ii) oxide on the filter paper should be minimal and can be placed in normal waste.
Keep the copper(ii) sulfate crystals to make solutions that do not need to be of an accurate concentration, or use as seedlings to grow crystals from saturated solutions.